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A Voice Sign in Chorea

PRELIMINARY REPORT

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PRELIMINARY REPORT

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I shall first briefly review the literature on chorea, then summarize that literature, mention the older methods, show the newer methods and the results obtained, with my conclusions.

The earliest recorded reference to voice changes in chorea is by John Eberle,[1] 1841, who said, "The voice is altered and articulation is indistinct and stuttering." From this date it is interesting to follow the literature somewhat chronologically.

Dunglison[2] in 1842 wrote, "The articulation is also affected at times so as to occasion stammering."

Romberg,[3] 1853 (Graves), cites three cases in which the respiratory function was profoundly affected.

Meigs and Pepper,[4] 1870, said, "The muscles of the internal and external respiratory apparatus are rarely affected."

Von Ziemssen,[5] who, according to Graves, seems to be the first to have paid particular attention to the disturbed respiratory function in chorea, says, previous "views are too ambiguous to permit of such interpretation," i. e., respiration is not involved. He says, "Irregularities are often observed in the act whether of inspiration or expiration which can only be interpreted as choreic."

Von Ziemssen describes a laryngeal chorea, and says, "It is a usual accompaniment of the severe form of the disease and characterized by insufficient force and duration of the tension of the vocal cords in phonation, owing to a want of coordination and persistence in the muscular act."

I would call especial attention to this statement, for it is to this that my own conclusions are added, and, as far as I know, have never yet been recorded.

* Being contributions from the Psychopathic Hospital, Boston, No. 43 (1914. 9). The previous contribution, No. 42 (1914. 8), was by Dr. E. E. Southard, entitled "The Mind-Twist and Brain-Spot Hypotheses," and published in Psychological Bulletin, April 15, 1914. The present contribution (March, 1914) was read to the New England Pediatric Society, Feb. 27, 1914.

1. Eberle, John: A Treatise on the Practice of Medicine, 1841.
2. Dunglison, Robley: Practice of Medicine, 1842.
3. Romberg: Manual of Nervous Diseases, 1853, ii.
4. Meigs and Pepper: Practical Treatise on the Diseases of Children, 1870.
5. Von Ziemssen: Encyclopedia, 1877, xiv.

Althaus[6] in 1878 wrote: "The patient cannot sing because the respiration is jerky and explosive. That the diaphragm and abdominal muscles suffer is shown by unequal and irregular respirations."

Bristowe[7] in 1879: "The difficulty of speech depends not infrequently on the spasmodic affection of the larynx and respiratory muscles, which compels him to draw his breath suddenly through the laryngeal orifice with a strained sound."

Rosenthal[8] in 1879 said: "Speech is embarrassed, due to spasmodic action of muscles of respiration, of the larynx and pharynx."

Trousseau[9] in 1882: "Strange sounds are occasionally produced, the voice coming out in inspiration instead of expiration. Inspiratory muscles suddenly contract convulsively, cause the air to rush into the larynx so that from this kind of antagonism between the mind that wills the speech and the inspiratory muscles the voice undergoes a strange alteration."

Roberts,[10] 1884: "Respiratory movements are infrequent, jerky and irregular. Muscles of larynx are rarely implicated, those of the pharynx never."

James Ross[11] in 1885: "In laryngoscopic examination the vocal cords have been observed to act in an irregular and disorderly manner."

M. Allen Starr,[12] 1894: "Occasionally the laryngeal and respiratory muscles are affected and noises are made in the throat."

J. Lewis Smith,[13] 1896: "In rare instances chorea affects the respiratory muscles so as to produce a peculiar involuntary barking or squeaking voice by the forcible expulsion of air over the tense vocal cords."

Ch. Féré[14] in 1897: "The contortions of the features are associated with disturbance of speech."

C. E. Bewar,[15] 1898: "The respiratory muscles may act irregularly."

Wollenberg,[16] 1899: "Speech is in some degree in all cases, disturbed. . . . The patient can enunciate a few syllables, or perhaps only one, and then a deep and hasty inspiration occurs."

6. Althaus: Diseases of the Nervous System, 1878.
7. Bristowe: Treatise on the Theory and Practice of Medicine, 1879.
8. Rosenthal: Clinical Treatise on Diseases of the Nervous System, 1879, ii.
9. Trousseau: Lectures, 1882, i.
10. Roberts: Theory and Practice of Medicine, 1884.
11. Ross, James: Handbook of Diseases of the Nervous System, 1885.
12. Starr, M. Allen: Chorea, in the American Text-Book of Diseases of Children, 1894.
13. Smith, J. Lewis: Diseases of Children, 1896.
14. Féré, Ch.: Spasmodic Neuroses, Twentieth Century Practice, edited by Stedman, 1897, x.
15. Bewar, C. E.: Diseases of Nervous System, 1898.
16. Wollenberg: Chorea, Paralysis Agitans Paramyoclonus Multiplex, Vienna, 1899.

Sachs,[17] 1900: "In some a peculiar condition of speech occurs which is in part due to difficulties in articulation and in part to choreic movements in respiratory muscles, necessitating rapid breathing."

Frederick Taylor,[18] 1900: "Speech is irregular and badly sustained and the patient cannot sing a long note. This is no doubt largely due to the imperfect action of the respiratory muscles."

Taylor and Wells[19]: "Speech is often defective (dysarthria) due to choreic action of the muscles used in articulation and also in respiration."

Butler,[20] 1904: "The speech is confused, indistinct and difficult."

Oppenheim,[21] 1905: "Irregular, spasmodic breathing occurs."

J. H. Musser[22]: "Irregular, jerky inspirations."

J. K. Monro[23]: "Speech often impaired, due possibly to involvement of the larynx. Speech is apt to be uttered quickly and be interrupted."

Osler,[24] 1906: "The inability to speak is in articulation rather than in phonation."

Edwards,[25] 1907: "Speech is quicker than normal and may be aggravated by irregular movements of the glottis and respiratory muscles."

Tyson,[26] 1907: "Speech is affected sooner or later in one-fourth of the cases, but the extent varies greatly from slight hesitation to incoherent, the difficulty being in the muscles of articulation rather than in phonation."

Guthrie,[27] 1907: "Speech is frequently indistinct and impossible from incoordination, coordination and spasm of muscles concerned in articulation and respiration."

Rotch,[28] 1906: "Speech may become slow and indistinct from affection of muscles of tongue and larynx."

"In severe cases the difficulty in speech may be enhanced by the mental condition, which may be represented by dulness and apathy and the child cannot or will not speak."

Holt,[29] 1906: "All degrees of speech disturbances are seen, from the slight difficulty in articulation due to inability properly to control the

17. Sachs: Treatise on the Nervous Diseases in Children, 1900.
18. Taylor, Frederick: Chorea in Practice of Medicine, edited by Gibson, 1900.
19. Taylor and Wells: Reference Handbook of Medical Science, Ed. 2, 1901.
20. Butler: Diagnosis of Internal Medicine, 1904.
21. Oppenheim: Lehrbuch der Nerven Krankheiten, 1905.
22. Musser, J. H.: A Practical Treatise on Medical Diagnosis, Ed. 5, 1905.
23. Munro, J. K.: Manual of Medicine, 1906.
24. Osler: Practice of Medicine, Ed. 6, 1906.
25. Edwards: Practice of Medicine, 1907.
26. Tyson: Practice of Medicine, Ed. 4, 1907.
27. Guthrie, L. G.: Functional Nervous Disorders in Children, 1907.
28. Rotch: Pediatrics, 1906, p. 934.
29. Holt: The Diseases of Infancy and Childhood, 1906, p. 724.

movements of tongue and lips, to a condition in which speech is almost impossible. In rare cases speech has been temporarily lost."

Starr,[30] 1913: "Occasionally laryngeal and respiratory muscles are affected; breathing is irregular and noises are made in the throat. Difficulty in talking and swallowing are serious. In a few instances speech becomes affected early and may be so indistinct as to be scarcely understood; in these cases grunting noises may be made in the throat."

Church and Peterson,[31] 1900: "The lips may be quickly pursed up or retracted, the tongue protruded or retracted, the teeth snapped together. In this way speech is impaired and becomes halting and explosive, due entirely to faults of articulation, as the larynx is practically never involved. The tongue is usually affected very early. Diaphragm is commonly invaded, causing irregularity of respiration and sometimes spasmodic noises, or peculiarly involuntary or clucking sounds." Graves made a painstaking study of respiratory irregularities which by a suitable self-registering apparatus he finds practically always present, even in mild cases, . . . and persist long after the more noticeable symptoms disappear.

Oppenheim,[32] 1904: "Tongue and other articulatory organs often take part in the twitchings. The tongue is thrown around in the mouth or protrudes through the teeth, causing a certain amount of disturbance of speech. The words are tossed out suddenly, broken off, or indistinct, separated by irregular respiratory movements. Gurgling and smacking noises are also produced by the action of the glossal musculature. Speech may be so disturbed the patient cannot utter a word for days or weeks. Respiratory muscles are generally affected, especially the diaphragm; irregular, spasmodic breathing occurs. Muscles of phonation are rarely involved."

SUMMARY OF PREVIOUS LITERATURE

To sum up, the literature contains many varied and vague terms in description of the voice in chorea. Among these such terms as "stuttering" "voice affected," "irregularities," "want of coordination and persistence in the muscular act," "strained sound," "embarrassed," "strange alteration," "squeaky voice," "disturbed," "defective," "confused," "indistinct and difficult," quicker than normal," "hesitation to incoherence," "*all degrees* of speech disturbance are seen!" "halting and explosive."

Any uniform statement of simple fact is everywhere lacking, making *in toto* a hodgepodge of inconsistencies.

30. Starr: Nervous Diseases, Organic and Functional, 1913, p. 780.
31. Church and Peterson.
32. Oppenheim: Diseases of the Nervous System, 1904.

Had the method of approach been different their end-results and findings would have been conclusive and final.

To turn to their method:

SUMMARY OF PREVIOUS METHODS

No recording apparatus appears to have been used. Even Starr, in whose clinic Scripture was in charge of the speech laboratory, reports no graphic records.

Merely the eye and the ear were their recorders. However accurate these may be, the graphic record is surely better.

NEW METHODS OF VOCAL RECORD

The kymograph, equipped to register sound, records graphically what neither eye nor ear can detect. To do this there must be the special attachment of mouthpiece and nosepiece that register air movements in a closed tube on a membrane from which stretches a lever to smoked paper on a revolving drum. This method applied to the choreic voice yielded new facts.

WHAT THE KYMOGRAPH RECORDS

The voice kymograph—or the tambour with mouthpiece and connecting air space—records two changes in that contained air—pressure and vibration—pressure by a slow long rise of the pointer on the smoked drum, and vibration by a quick, short-excursion rise and fall. These rises and falls are made less frequent the lower in the scale the vibration is, and more frequent for the given space traversed the higher in the scale the vibration is.

In other words, when the apparatus is connected up with the respiratory passages the needle records respiratory air pressure and vocal cord vibration and variations in this pressure and vibration.

THE VOICE RECORD IN CHOREA

The patient sounded a prolonged A into the vocal kymograph. Normally this sound would record a uniform pressure and uniform vibration, shown in the even general elevation and the succession of equal small vibrations. Translating these then into vocal terms there would be an even intensity and even pitch.

The variation from the normal made by the choreic voice can easily be seen in the graphic records herewith.

They show the voice of chorea to be a sudden change in intensity and pitch. Example: down town.

After such a record has revealed just what the voice change is, its cause is easily traced.

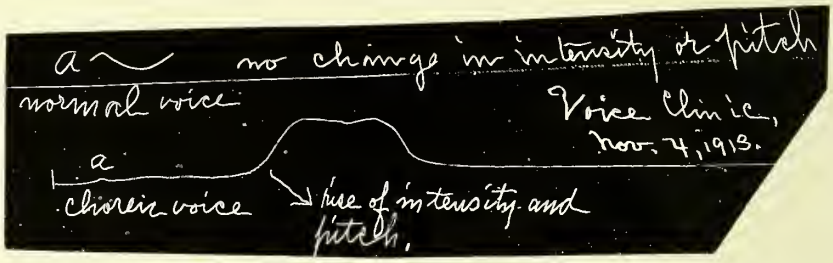
EXPLANATION OF THE VOCAL RECORD IN CHOREA

Increase of intensity comes from increased contraction of expiratory muscles, and rise in pitch results from increased contraction of the muscles of the vocal cords. And chorea makes these contractions. In other words, or stating the same in its order of sequence, choreic muscle contractions in the expiratory muscles makes increased air pressure, which results in increased intensity in the voice; and choreic muscle contractions in the muscles moving the vocal cords result in increased tension there, which increases the frequency of vibration and raises the pitch in the voice.

CONCLUSIONS

1. Choreic contractions cause changes of pitch and intensity in vocal utterance.

2 The most marked change is in the rendering of the vowel *a* as in *around.*



Traeing showing voice changes in chorea.

3. These changes occur so frequently[33] and so constantly accompany the choreic contraction as to give color to the claim that change of pitch and intensity are signs of chorea of equal dignity with the choreic knee jerk of Shaw,[34] and the respiratory signs of Graves.[35]

4. If I am right in finding no record of vocal changes of pitch and intensity in chorea in the literature to date, the present findings indicate a new sign in chorea which should be of some value!

SUMMARY

Examination of vocal utterance on the kymograph demonstrates a pretty constant voice change of rise in pitch and increase in intensity accompanying choreic movements—a vocal change—which deserves recognition as a new sign in chorea.

110 Bay State Road.

33. Swift, Walter B.: Reflex Frequency and Its Clinical Value, Jour. Nerv. and Ment. Dis., 1913, lx, No. 9.

34. Shaw, H. L. K.: The Knee Jerk in Chorea, Albany Med. Ann., May, 1897.

35. Graves, Wm. W.: A Study of the Respiratory Signs in Chorea Minor. Jour. Am. Med. Assn., 1909, lii, 364.